D H E C
PROMOTE PROTECT PROSPER

00 Bull Street
Columbia, SC 29201-1708

56

MEMORANDUM

TO Project File

John Litton, P E , Division Director
Division of Hazardous and Infectious Waste
Bureau of Land and Waste Management

FROM Susan Peterson, Environmental Engineer Associate
Corrective Action Engineering Section
Bureau of Land and Waste Management

SUBJ Evaluation of the Naval Weapon Station Charleston's status under the RCRIS Corrective Action Environmental Indicator Event Codes (CA725 and CA750)
EPA I D Number SC8 170 022 620

DATE September 29, 1998

CC Denise Housley, Region IV EPA
Caron Falconer, RCRA North Programs Section Region IV EPA
Wayne Fanning, Director, Trident EQC District

I. PURPOSE OF MEMO

This memo is written to formalize an evaluation of the Naval Weapon Station Charleston's status in relation to the following RCRIS corrective action codes

1) Human Exposures Controlled Determination (CA725),

2) Groundwater Releases Controlled Determination (CA750)

The applicability of these event codes adheres to the definitions and guidance provided by the Office of Solid Waste (OSW) in the July 29 1994, memorandum to the Regional Waste Management Division Directors

The State of South Carolina became authorized, in January 1995, to implement those portions of Resource Conservation and Recovery Act (RCRA) covered under the HSWA Corrective Action process The recommendations provided in this memo have been generated in cooperation with the USEPA Region IV staff through the use of EPA's current Environmental Indicator ranking system

II. HUMAN EXPOSURES CONTROLLED DETERMINATION (CA725)

There are five (5) national status codes under CA725 These status codes are

1) YE Yes, applicable as of this date

2) NA Previous determination no longer applicable as of this data

3) NC No control measures necessary

4) IN More information needed

5) NO Facility does not meet definition

Note that CA725 is designed to assess the potential for human exposures over the entire facility The code does not evaluate specific actions undertaken at individual solid waste management units (SWMUs) and areas of concern (AOCs) Therefore, every area at the facility must meet the definition before a YE, or NC, status code can be entered for CA725 The NO status code should be entered if there are current unacceptable risks to human health due to releases of hazardous wastes or hazardous constituents from any SWMUs or AOCs The IN status code is designed to cover those cases where insufficient information is available to make an informed decision on whether or not human exposures are controlled If an evaluation determines that there are both unacceptable and uncontrolled current risks to human health at the facility (NO) along with insufficient information on contamination or exposures at the facility (IN), then the priority for the EI recommendation is the NO status code

According to recent guidance from USEPA Region IV, the previous relevance of NA as a meaningful status code was eliminated by the June 1997 Data Element Dictionary's inclusion of NO and IN to the existing YE and NC status codes In other words, YE, NC, NO, and IN cover all of the scenarios possible in an evaluation or reevaluation of a facility for CA725 Therefore, the NA status code will no longer be used for facilities located in Region IV

This particular CA725 evaluation is the first evaluation performed by DHEC for Naval Weapons Station Charleston Because assumptions have to be made as to whether or not human exposures to current media contamination are plausible and, if plausible, whether or not controls are in place to address these plausible exposures, this memo first examines each environmental medium (i e , soil, groundwater, surface water, air) at the entire facility including any offsite contamination emanating from the facility rather than from individual areas or releases After this independent media by media examination is presented, a final recommendation is offered as to the proper CA725 status code for Naval Weapons Station Charleston

The following discussions, interpretations and conclusions on contamination and exposures at the facility are based on the following reference documents

1 Interim RCRA Facility Assessment, May 1988
2 Groundwater Contamination Investigation Report SWMU 10, December 1995

3 RFI Report, SWMUs 3/4/5/6, 1996
4 Confirmatory Sampling Report for 29 Sites, April 1997
5 Closure Plan for SWMU 10, July 1998
6 RFI Work Plan for SWMUs 11, 12, 24, January 1998
7 Handout Scoping work plan for additional field work at SWMU 12. August 1998

III. MEDIA BY MEDIA DISCUSSION OF CONTAMINATION AND THE STATUS OF PLAUSIBLE HUMAN EXPOSURES

GROUNDWATER

In the Charleston area, the Cooper Marl is impermeable and acts as the confining bed for the Santee, which forms a confined aquifer Ground water in the Santee flows generally to the southeast The shallow unconfined ground water system above the Cooper Marl discharges into the Cooper River directly, or indirectly via discharge into its tributaries (namingly Foster Creek and Goose Creek) However, the groundwater flow direction may differ at individual SWMUs and AOCs The surficial aquifer at the Naval Weapons Station is not used as a source of drinking water Research indicated that there are no drinking water wells in existence on the base A well exists near Marrington Plantation on the base. but it is used to irrigate a playground

Groundwater has not been sampled at all SWMUs and AOCs throughout the NWS facility The results of the 1988 Interim RCRA Facility Assessment and subsequent additional investigations have helped the NWS develop a priority list of SWMUs and AOCs from which to conduct groundwater investigations Upon review of the numerous resulting reports, groundwater contamination exists at concentrations above relevant action levels at several SWMUs and AOCs This memo will not discuss each SWMU/AOC that meets the above description but rather provide an account of the plausible human exposure from groundwater contamination at SWMUs 10 and 12

The following paragraphs will provide an overview of the SWMUs 10 and 12 and a narrative explanation regarding the contamination levels that are noted in the associated table A short statement as to the NWS's planned corrective action activities will be included in the end

SWMU 10

SWMU 10 is the site of a former sump (also referred to as a vault) that was used from 1982 to 1992 for the storage of OTTO fuel II wastes from practice torpedo servicing activities at Building 930 Clean closure was attempted in 1992 and 1993, by rinsing the waste OTTO fuel collection system (piping and sump), removing the sump along with all visibly contaminated soil, and grouting the piping place Confirmation soil and groundwater samples were collected from the bottom of the sump excavation Analytical results of the samples indicated contamination still remained on site and clean closure was not achieved An investigation of groundwater was conducted from January to June 1994 to assess groundwater contamination As part of the investigation, six groundwater monitoring wells were installed at Building 930 and four of these wells (one upgradient and three downgradient of the former OTTO fuel sump location) were sampled and analyzed

Water levels collected at three of the six monitoring wells established the groundwater flow direction to be generally to the west Both northwest and southwest components of local groundwater flow were observed Because no monitoring wells were installed at the southeast corner of Building 930,

the extent of the local southwesterly component of groundwater flow could not be confirmed Groundwater flows to the northwest across the Building 930 area and likely continues northwest as the ground surface drops toward the drainage ditch The flow of groundwater beyond Building 930 has not been confirmed since no water level information has been collected beyond the Building 930 area or at the drainage ditch A northwest to southwest trending divide conducted in 1994 revealed area wide groundwater contamination around Building 930

Table 1 summarizes the inorganic and organic constituents detected during the 1993 closure and 1994 groundwater contamination investigation activities This table does not include the results of the confirmation sampling following the sump excavation that revealed the existence of OTTO fuel contamination in the soil and groundwater Table 1 shows that inorganic and organic constituents were found to be present at levels exceeding Safe Drinking Water Act Maximum Contaminant Levels (MCLs) and US EPA Region III tap water risk-based concentrations (RBCs) When MCLs and US EPA Region III tap water RBCs are unavailable, the Department typically requires groundwater remediation to background concentrations

Table 1
Inorganic and Organic Constituents Detected during the 1993 and 1994 field investigations
SWMU 10

Above Safe Drinking Water Act Maximum Contaminant Limits (MCLs) **units mg/l**	Above Region III Tap Water Risk-Based Concentrations **units mg/l**
Metals Beryllium (0 0068) Chromium (0 14 - 0 18) Iron (20 - 93) Lead (0 033 - 0 084) Manganese (0 16 - 0 53)	**Metals** Beryllium (0 0068) Iron (20 - 93) Manganese (0 16 - 0 53)
VOCs 1,1-Dichloroethene (0 059 - 0 160) trans 1,2-Dichloroethylene (0 120) 1,1,1-Trichloroethane (0 0097 - 0 20) Methylene chloride (0 006)	**VOCs** 1 1-Dichloroethene (0 059 - 0 160) trans 1,2-Dichloroethylene (0 120) Bromodichloromethane (0 006 - 0 10)
	SVOCs 1 4-Dioxane (0 16)

The NWS has submitted a revised closure plan for SWMU 10 This plan incorporates the knowledge gained from the previous closure activities and groundwater contamination investigation activities The NWS will conduct additional sampling to determine the horizontal and vertical extent of soil and groundwater contamination

Building 930 at SWMU 10 is currently used as a mobile mine detachment center No work associated with OTTO fuel is performed The building exists within a chain linked fence that is locked after the completion of the work day SWMU 10 is located inside a restricted ordnance area, as such access to the site is very limited NWS personnel and/or personnel who work at the center are required to show identification each time they pass through the guarded gate Normal facility

maintenance is performed by the Public Works Office Prior to conducting maintenance operations that my disturb site media (surface water, soil, sediment, groundwater), the Public Works Office personnel must notify the Environmental, Safety, and Fire Offices of their intentions A permit is required to perform any digging operations

SWMU 12

SWMU 12 is the Former Southside Pentachlorophenol (PCP) Treatment Area It is located in Building 88 along the eastern section of NWS The unit was active from approximately the early 1970s until 1981 Treatment operations occurred infrequently and were conducted on paved surfaces PCP was the primary waste generated at the site The site is known to have surficial contamination of PCP caused by runoff from drippage and spillage of preservatives around a wood treatment dip tank in Building 88 Low levels of PCP contamination (less than relevant action levels) were verified during a 1987 investigation of sediment, soil, and surface water samples Groundwater was not sampled as part of this investigation

Groundwater sampling was conducted in March 1998 The investigation verified the existence of an underground storage tank (UST) located near the eastern edge of the site Research concludes that the UST formerly contained solvents used during degreasing operations Monitoring wells (consisting of a shallow and deep well cluster) were installed at four (4) locations They were sampled and analyzed for PCP, VOCs, SVOCs, and Metals PCP levels were again confirmed to exist at levels less than relevant action levels VOCs were nondetect in the shallow and deep wells at MW04 and MW01, located adjacent to the west side of Building 88 and approximately 300 feet west of Building 88, respectively VOCs and inorganics were found to be present at levels exceeding MCLs and US EPA Region III Tap Water RBCs The VOCs, including 1,1-Dichloroethane, 1,2-Dichloroethene, Tetrachloroethene, and Trichloroethene, were found in well clusters MW02 and MW03

Table 2 summarizes only the organic constituents detected at well clusters MW02 and MW03 The highest levels of VOCs were located in the shallow well at the MW03 location When MCLs and US EPA Region III Tap Water RBCs are unavailable, the Department typically requires groundwater remediation to background concentrations

Table 2
Organic Constituents Detected during the March 1998 groundwater contamination investigation
SWMU 12

Above Safe Drinking Water Act Maximum Contaminant Limits (MCLs)	Above Region III Tap Water Risk-Based Concentrations
VOCs (ug/l)	**VOCs (ug/l)**
1,1,1-trichloroethane (380)	
1,1-dichloroethene (2500)	1,2-trichloroethane (3J - 4) 1,1-dichloroethene (28 - 2500)
1,2-dichloroethene (total) (8900)	1,2-dichloroethane (1) 1,2-dichloroethene (total) (8900)
tetrachloroethene (41J - 4600)	tetrachloroethene (41J - 4600)
trichloroethene (2 - 21000)	trichloroethene (2 - 21000)
vinyl chloride (2 - 470)	vinyl chloride (2 - 470)

The NWS has made preliminary conclusions based on the March 1998 investigation The high VOCs appear to originate from the UST Shallow groundwater appears to be more impacted than deeper groundwater in the surficial aquifer The confining unit appears to be continuous The UST is located near the eastern edge of the site Groundwater direction is east and so the extent of VOC contamination is unknown Additional investigation is planned for SWMU 12 to determine whether or not VOC contamination has moved beyond the SWMU boundary This will also aid in determining the horizontal and vertical extent of the soil and groundwater contamination

Building 88 at SWMU 12 is currently unoccupied A 7-8' chain link fence, topped with barbed wire, encompasses the building Signs are posted on the fence to explain that no unauthorized entry is allowed The fence is kept locked at all times The NWS has removed the dumpsters outside the building, eliminating the need for trucks to drive to the SWMU on a regular basis

Although investigations have confirmed the presence of groundwater contamination, no plausible human exposure exists from this contamination

Based on the above discussion, no plausible human exposures to groundwater contamination exist. As such, no control measures for groundwater are necessary.

SURFACE WATER

Releases from SWMUs and/or AOCs have possibly contaminated surface water at concentrations above relevant action levels The surface waters respective to the NWS site are the Cooper River, Back River, Foster Creek, and Goose Creek NWS is located west of and adjacent to Cooper River and Back River Surface waters for the northern portion of the site drain into the Foster Creek basin and directly into the Back River Foster Creek, a meandering, third order tributary, flows east into the Back River, a second order tributary of Cooper River Surface waters for the southern half of NWS drain into the Goose Creek basin and also directly into Cooper River Goose Creek is a meandering second order tributary flowing southeast into Cooper River The Cooper River flows south into Charleston Harbor, then into the Atlantic Ocean

SWMU 3

The NWS conducted an RFI at SWMU 3, the Old Northside Landfill, in the early 1990s based on the recommendations contained in the 1988 RFA SWMU 3 is located at the headwaters of Foster Creek The RFI activities included extensive sampling for all media The NWS placed a clay cap on SWMU 3 in 1993 as a control measure during the RFI activities A comprehensive RFI report and a baseline risk assessment was submitted following the RFI activities The report confirmed no evidence of contamination in the soil, sediment, surface water, or groundwater above the relevant action levels The NWS has recognized that pockets of groundwater contamination may exist within the site that have not migrated to the perimeter (and have been intercepted by one of the existing wells) Therefore one year of quarterly monitoring followed by four years of annual monitoring will be performed to ascertain the above stated beliefs The results of the corrective action efforts at SWMU 3 reduce the possibility that a plausible human exposure to surface water exists

SWMU 12

The single surface water sample collected during the 1987 investigation contained PCP contamination at the level of 0 003 mg/l which exceeded the established MCL of 0 001 mg/l Although this sample verified contamination, no surface water samples were collected and analyzed as part of the 1998 investigation That investigation determined the presence or absence of contamination in groundwater As stated previously, high levels of VOC contamination was present at specific monitoring wells

The NWS plans to address the VOC contamination through additional investigation Presently, it is not known whether surface water samples will be collected, and if so, for what constituents they will be analyzed However, the investigations will provide a clearer picture as to the impact of contamination in all media, and whether the contamination has moved offsite

Additional investigation of surface water is needed in order to make a determination regarding PCP contamination Regardless of whether PCP contamination may exist in surface water at levels that pose a concern to human health and the environment, no plausible human exposure exists from this contamination To reiterate in support of this statement, normal facility maintenance is performed by the Public Works Office Prior to conducting maintenance operations that my disturb site media (surface water, soil, sediment, groundwater), the Public Works Office personnel must notify the Environmental, Safety, and Fire Offices of their intentions A permit is required to perform any digging operations

Based on the above discussion, no plausible human exposures to surface water contamination exist. As such, no control measures for surface water are necessary.

SOIL

Soil at the facility is contaminated at concentrations above relevant action levels There are numerous SWMUs/AOCs contaminated with inorganics, PCBs, and pesticides There have been numerous soil sampling events that have been conducted throughout the facility at many of the SWMUs/AOCs The Confirmatory Sampling effort conducted in 1997 established data on 29 sites Following that effort, each SWMU/AOC at the facility had a core amount of sampling data

Keeping in mind the NWS's budget constraints and the focus of the sampling (determining the presence or absence of contamination) very few, if any, of these samples could be used as background samples The NWS is currently unable to prove that some elevated levels of inorganics in media can be attributed to background conditions The NWS is in the process of developing a background table to support that claim

The NWS has determined that soil is contaminated through Confirmatory Sampling and RFI field investigations The results may verify a single source of contamination, and depending on the type of contamination, an appropriate measure may be as simple as removal of the contaminated soil Such is the case for SWMUs 5, 34, and 35

SWMU 5

SWMU 5 is the Northside Public Works Storage Area An RFI completed in 1996 concluded surface soils in the drainage ditch along the eastern portion were contaminated with PCBs above the relevant action levels The NWS plans to, but has not yet removed the PCB contaminated soil at SWMU 5

SWMU 5 is in the general location of Public Works shops and operations The Public Works Office employees receive specialized training in handling and working with PCBs Although not located within a restricted area, SWMU 5 is located about five (5) miles north of Redbank Road, a main road of the NWS A guarded gate controls and limits access to the site The training and experience level of the NWS personnel that work near the site, in addition to the being in a location that makes the possibility of trespassers improbable, support that belief that a plausible human exposure to surface water does not exist

SWMUs 34 and 35

SWMUs 34 and 35 are the Southside Container Repair Facility and the Southside Railcar Sandblasting Area, respectively Soil sampling indicated that the sandblast grit covering a portion of each SWMU contained heavy metals

SWMU 34 is located in a wooded area about 300-400' from the access road Signs are posted around the site to show the boundaries and to note that trespassing is prohibited Furthermore, SWMU 34 is located inside the ordnance magazine area, a highly restricted area Access to the ordnance magazine area is through a guarded gate

SWMU 35 is located in the Central Administration area, near an automotive, heavy equipment, and railroad maintenance area Although located amidst building and the operational areas listed above, SWMU 35 is located in a wooded area that is not subject to random pedestrian traffic The site is concealed from the roadway The NWS plans to remove the PCB and heavy metals contamination in the near future

Although contamination (PCBs and heavy metals) exists at SWMUs 5, 24 and 35, no plausible human exposure to contaminated soil exists To reiterate in support of this statement, normal facility maintenance is performed by the Public Works Office Prior to conducting maintenance operations that my disturb site media (surface water, soil, sediment, groundwater), the Public

Works Office personnel must notify the Environmental, Safety, and Fire Offices of their intentions A permit is required to perform any digging operations

Based on the above discussion, no plausible human exposures to soil contamination exist. As such, no control measures for soil are necessary.

AIR

Releases to air from soil, groundwater and/or surface water contaminated by SWMUs and/or AOCs at the facility are not known to be occurring at concentrations above relevant action levels or not expected to be occurring above relevant action levels

Therefore, there is no human exposure to contamination via an air route.

IV. STATUS CODE RECOMMENDATION FOR CA725:

As explained in Section III, because human exposures to contamination are not currently controlled for groundwater, surface water and soil it is recommended that CA725 YE be entered into RCRIS Page 7 of this memo is the summary table for the selection of the proper Status Code for CA 725

V. GROUNDWATER RELEASES CONTROLLED DETERMINATION (CA750)

There are five (5) status codes listed under CA750

1) YE Yes, applicable as of this date

2) NA Previous determination no longer applicable as of this date

3) NR No releases to groundwater

4) NO Facility does not meet definition

5) IN More information needed

The first three (3) status codes listed above were defined in January 1995 Data Element Dictionary for RCRIS The last two (2) status codes were defined in June 1997 Data Element Dictionary

The status codes for CA 750 are designed to measure the adequacy of actively (e g , pump and treat) or passively (e g , monitored natural attenuation) controlling the physical movement of groundwater contaminated with hazardous constituents above relevant action levels The designated boundary (e g the facility boundary, a line up gradient of receptors, the leading edge of the plume as defined by levels above action levels or cleanup standards, etc) is the point where the success or failure of controlling the migration of hazardous constituents is measured for active control systems Therefore, every contaminated area at the facility must be evaluated and found to have the migration of contaminated groundwater controlled before a "YE" status code can be entered

If contaminated groundwater is not controlled in any area(s) of the facility, the NO status code should be entered If there is not enough information at certain areas to make an informed decision as to whether groundwater releases are controlled, then the IN status code should be entered If an evaluation determines that there are both uncontrolled groundwater releases for certain units/areas (NO) and insufficient information at certain units/areas of groundwater contamination (IN), then the priority for the EI recommendation should be the NO status code

According to recent guidance from USEPA Region IV, the previous relevance of NA as a meaningful status code was eliminated by the June 1997 Data Element Dictionary's inclusion of NO and IN to the existing YE and NC status codes In other words, YE, NC, NO, and IN cover all of the scenarios possible in an evaluation or reevaluation of a facility for CA725 Therefore, the NA status code will no longer be used for facilities within Region IV

This evaluation for CA750 is the first formal evaluation performed for the Naval Weapons Station Charleston Please note that CA750 is based on the adequate control of **all** contaminated groundwater at the facility

The following discussions, interpretations and conclusions on contaminated groundwater at the facility are based on the following reference documents

1 Interim RCRA Facility Assessment, May 1988
2 Groundwater Contamination Investigation Report SWMU 10, December 1995
3 RCRA Facilities Investigation Report, SWMUs 3/4/5/6, 1996
4 Confirmatory Sampling Report for 29 Sites, April 1997
5 Closure Plan for SWMU 10, July 1998
6 RCRA Facilities Investigation work plan for SWMUs 11 12, 24, January 1998
7 Handout Scoping work plan for additional field work at SWMU 12, August 1998

VI. STATUS CODE RECOMMENDATION FOR CA750:

Based on data contained in the documents referenced in Section V and summarized in the groundwater portion of Section III, releases from SWMUs and/or AOCs have contaminated groundwater at concentrations above relevant action levels

Although the groundwater is contaminated above relevant action levels, control measures have not been implemented Because all groundwater contamination at the facility is not controlled and this is the first evaluation at this facility, it is recommended that CA750 NO be entered into RCRIS

NWS plans to conduct additional groundwater investigations at SWMUs where groundwater is contaminated above relevant action levels These SWMUs include, but are not exclusive of SWMUs 10 and 12, previously discussed in the Groundwater portion of Section III The results of the investigations will be used in determining the appropriate control measures

Table 1. Summary Table for Use in Selecting the Proper Status Code for CA725

OPTION	Media				STATUS CODE IF ALL MEDIA FALL UNDER THE SAME OPTION	STATUS CODE FOR SPECIFIC FACILITY
	Groundwater	Surface Water	Soil Sediment	Air		
1.Media not contaminated[1]				✓	NC	YE (1B)
2.The media is contaminated and cleanup standards **met** to the point of controlling plausible human exposures					YE (1A)	
3 The media is contaminated *[onsite and/or offsite]* and all plausible *[onsite and/or offsite]* human exposures are controlled by *[Stabilization/IM and/or Access Controls]*[2]	✓	✓	✓		YE (1B)	
4 The media is contaminated *[onsite and/or offsite]* and some plausible human exposures are not controlled					NO (if first evaluation) NA (if second or subsequent evaluation)	

FOOTNOTES

[1] If there is not enough concrete information available for an easy determination as to whether or not a medium is contaminated, then, a judgement must be made as to whether or not contamination can be reasonably expected given the site-specific nature of facility's operational history If a reasonable assumption on contamination cannot be made for every environmental media, then a CA725 determination cannot be made

[2] Stabilization/Interim Measures and/or Access Controls which account for all exposures in all media at the facility will be covered under this option In addition to fences, soil covers, etc , Access Controls can include those specific cases where human exposures to onsite contamination are restricted due to a lack of human receptors (e.g , the groundwater is contaminated but there are no onsite drinking water wells and the facility recognizes that drinking water wells should not be installed) With regard to contamination that has migrated offsite, plausible human exposures cannot be considered controlled unless tangible control measures have been implemented to prevent human exposure to the offsite contamination